REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and the following remarks.

Claims 15-21 are pending in this application. By this Amendment, claims 15-21 are amended and claim 22 is added.

Claim 15 is amended to recite a bronze alloy "consisting of" Zn, Sn, Bi, Se, P and Cu. Claim 15 is also amended to recite "unavoidable impurities." Support for this amendment can be found at paragraphs [0022] and [0029] of the specification.

Claims 15, 16 and 20 are amended to recite "$0 < Se < 0.35$ weight% of Se." Support for this amendment can be found in the last two lines of paragraph [0024] of the specification.

Claims 16-19 and 20 are amended to delete "A copper-based alloy" and instead recite "The bronze alloy."

New claim 22 includes the features of claim 15, and includes the feature of "3.0 weight% or less of Ni." Support for this claim can be found at paragraphs [0022] and [0027] of the specification.

I. Claim Rejection Under 35 U.S.C. § 103

The Examiner rejects claims 15-21 35 U.S.C. § 103(a) as being unpatentable over Singh (U.S. 5,942,056), JP 2002-088427, or JP 2000-129375. Applicants respectfully traverse the rejection.

Present Invention

Claim 15 is directed to "A bronze alloy consisting of 5.0 to 10.0 weight% of Zn, 2.8 to 5.0 weight% of Sn, 0.25 to 3.0 weight% of Bi, $0 < Se < 0.35$ weight% of Se, less than 0.5 weight% of P, the balance of Cu and unavoidable impurities." Claim 20 is directed to "A bronze alloy consisting of 5.0 to 10.0 weight% of Zn, 2.8 to 5.0 weight% of Sn, 0.25 to 3.0 weight% of

Bi, 0 < Se < 0.35 weight% of Se, less than 0.5 weight% of P, the balance of Cu, and less than 0.2 weight% of Pb as an unavoidable impurity."

Moreover, the bronze alloys of claims 15 and 20 recite the features that the bronze alloy has "soundness improved during a course of solidification of the bronze alloy by crystallizing ZnSe that is an intermetallic compound capable of solidifying within a range of solidifying temperature as a temperature region between a solidus line and a liquidus line surpassing the solidus line in dendrite gaps of the alloy, thereby suppressing migration of a solute and consequently effecting dispersion of microporosities and by utilizing the crystallization of the intermetallic compound ZnSe for suppressing segregation of Bi that is a low melting metal capable of solidifying at a temperature falling short of the solidifying temperature of the bronze alloy and relying on the Bi to enter the microporosities and undergo dispersed crystallization and consequently suppress occurrence of microporosities."

The Examiner asserts that although the cited references do not disclose the recited intermetallic compound, and its function, microstructures and surface ratios, they are material properties formed during casting which would have been inherently possessed by the alloy composition as cast. Applicants respectfully disagree.

Singh

Singh relates to a leadless copper-based alloy containing Bi and mischmetal (or its rare earth equivalent) as the principal elements (see lines 12 and 23-25 of column 2). Although the allowable content of Se in Singh is 0 to 1%, the addition of Se in the reference is to enhance mechanical properties (see lines 1-28 of column 3). On the other hand, the present invention utilizes Se and Zn to form a ZnSe compound. Therefore, one of ordinary skill in the art would not have been motivated to enhance the soundness of an alloy by utilizing a ZnSe compound from the disclosure of Singh.

Moreover, Applicants submit herewith a Declaration under 37 CFR 1.132 comparing the alloys of the claimed invention and the alloys disclosed in Singh (as well as comparing

JP 2002-088427 and JP 2000-129375 to the claimed alloys). Comparative Test Data No. 1 in the Declaration shows that in Singh, where the alloy contains mischmetal, few ZnSe compounds could be formed, and no ZnSe compounds were crystallized out in the gaps between the dendrites. Therefore, the alloy of Singh does not inherently possess the recited properties of claims 15 and 20. Therefore, claims 15 and 20 would not have been obvious over Singh. Claims 16-19 and 21 depend from claim 15, and thus also would not have been obvious over the reference.

JP 2002-088427

JP 2002-088427 also does not disclose an alloy that inherently possesses the recited intermetallic compound (ZnSe), and its function, microstructures and surface ratios. The reference relates to a leadless bronze alloy containing boron as the principal element and further containing Bi and Se. Although the reference discloses that Se forms intermetallic compounds in conjunction with Zn or Cu, the object of the reference is to enhance machinability (see paragraphs [0004] and [0006] of the machine translation). Therefore, one of ordinary skill in the art would not have been motivated by JP 2002-088427 to enhance the soundness of an alloy utilizing a ZnSe compound.

In addition, Comparative Test Data No. 2 in the Declaration shows that no ZnSe compounds could be confirmed in the microstructure of the reference. In particular, the Declaration shows that eutectic Cu-B-Se alloys and Bi were present in the microstructure of the reference, and the presence of ZnSe compounds could not be confirmed in the structure, because almost all of the Se was consumed in the Cu-B-Se eutectic reaction (see FIG. 1 of the Declaration).

Moreover, an interrupted solidification test was performed in order to confirm that the Cu-B-Se component could fulfill the anchor effect described in the present specification in a similar way to a ZnSe compound (see e.g., paragraphs [0038] and [0041] of the specification). The test confirmed that the Cu-B-Se had already been crystallized out, and thus very few ZnSe compounds could even have the opportunity to fulfill the anchor effect if they were present.

Therefore, the Declaration shows that no ZnSe compounds were crystallized out in the gaps between the dendrites. Thus, the alloy disclosed in the reference does not inherently possess the recited intermetallic compound, and its function, microstructures and surface ratios.

Accordingly, claims 15 and 20 would not have been obvious over the reference. Claims 16-19 and 21 depend from claim 15, and thus also would not have been obvious over the reference.

JP 2000-129375

JP 2000-129375 also does not disclose an alloy that inherently possesses the recited intermetallic compound, and its function, microstructures and surface ratios. The reference relates to a leadless bronze alloy containing Mg as the principal element, and further containing Bi and Se. Although the reference discloses that Se forms intermetallic compounds in conjunction with Zn or Cu, the object of the reference is to enhance machinability (see paragraph [0019] of the machine translation). Therefore, one of ordinary skill in the art would not have been motivated by JP 2000-129375 to enhance the soundness of an alloy utilizing a ZnSe compound.

In addition, Comparative Test Data No. 3 from the Declaration shows that few ZnSe compounds could be formed, and no ZnSe compounds were crystallized out in the gaps between the dendrites in the alloy of the reference. Consequently, the alloy disclosed in the reference does not inherently possess the recited intermetallic compound, and its function, microstructures and surface ratios.

Therefore, claims 15 and 20 would not have been obvious over JP 2000-129375. Claims 16-19 and 21 depend from claim 15, and thus also would not have been obvious over the reference.

Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. New Claim

By this Amendment, new claim 22 is presented. Claim 22 recites an alloy including all of the recited components of claim 15 with the additional element of "3.0 weight% or less of Ni." Claim 22 is distinguished from the references for the reasons identified above with respect to claim 15. Accordingly, prompt examination and allowance of claim 22 are respectfully requested.

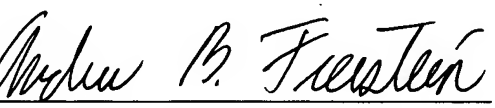
III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 15-21 and prompt examination and allowance of new claim 22 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place the application in better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

Teruhiko HORIGOME et al.

By: 

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Enclosure: Declaration Under 37 CFR 1.132

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